Relation Relation Relation

Q1 Q1 Q1

March-3 2022

November-B 2024

① **Bandwidth:** is the maximum rate at which data can be transfered over a network in a given amount of time. usually measured in bits per second (bps): BPS bits per second

FDD systems

② **FDD system:** It refers to the frequency Division Duplex (FDD) cellular system. is a type of wireless communication system, where separate frequency bands are allocated for uplink and down link: Uplink and down link

Up link: Uplink and downlink

Up link: Transmitting from mobile device to base station.

Down link: Transmitting from base station to mobile device.

09/11/2024 01:38

→ Simplex channel: A simplex channel is a communication channel that allows data to flow in only one direction.

2→ one device only send and other device can only received.

→ A duplex channel: is a communication channel that allows data flow in both direction between two device.

→ Half duplex: → at a time one.

→ Full duplex → simultaneously ↔

→ Control channel: is a dedicated communication channel in wireless and cellular networks used transmit & control or signalling information.

09/11/2024 01:38

⑤ What is spectrum →

Ans: Specific range of radio frequency allocate for transmitting voice, data and others forms of information over the air.

Spectrum is critical for enabling device to connect to network and communicate without interference →

Q: Voice channel: Communication channel for transmitting voice →

Problem - 2

Q: SIR: Signal to Interference ratio: is a key metric used to evaluate the quality of a signal relative to the interference that may effect it.

SIR ensure optimizing coverage, capacity, and ensure smooth users experience, especially in environments with high traffic. →

SIR

Q: Frequency reuse factor: is a concept in cellular network design that represents how often the same frequency channel are used in given area.

$$Q = D/R$$

$$= \sqrt{3N}$$

Where N = cell reuse pattern

D = distance between nearest Co-channel cells.

R = Radius of the cell

$S/R = 10 \log(Q^n/i_0)$

i_0 = Co-channel interference

Q = Frequency reuse factor.

SIR → indicates that the desired signal strength is much stronger than the interference. This results in clean, high quality communication with minimal noise or distortion

Q.

⇒ Path loss exponent:

Path loss is the reduction in signal strength as a radio waves travels through space from a transmitter to a receiver.

It occurs due to various factors like distances, obstacles, atomosphere condition and environment.

→ In system → minimum SIR need 15 dB

So thats why the system SIR must have larger than 15

Problem - 3

Q.) Blocking probability? Probability Prob

Ans:- It's the probability that user will not be able to access the network due to a lack of available channels. Typically expressed as a decimal or percentage.

Blocking Probability

Blocking probability of 0.02 means there is a 2% chance that a connection attempt will be blocked. ⟷

Earlang - B : ?

Earlang C : ?

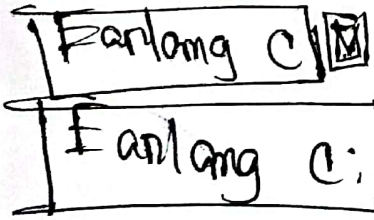
09/11/2024 01:38

Problem-10

① Hexagonal cell?

Traffic intensity??

Earlang B formula: Mathematical model used to calculate the probability that a new call on connecting attempt will be blocked and without using queuing such as a circuit switched network.



Earlang C formula?

The earlang C formula is a model to calculate the probability that a call on connection wait in a queue due to all servers being busy.

09/11/2024 01:38

Problem-10

Hexagonal cell: is a geometric shape commonly used in the design of cellular network systems to represent coverage areas or regions served by a single cell or base station.

Base station: is a fixed communication facility in cellular network that uses antennas, transmitters, and receiver to establish and maintain wireless connection with mobile device and in its coverage area.

What do you mean by fixed station:

Permanently setup to support communication by managing connection. Base stations are fixed communication since its permanently setup.

→ 1 Earlang: 100% usage of a channel, which means its continously occupied.

→ 0.5 Earlang: 50% usage of channel indicating its occupied half of the time.

Pb – 9

Gain: → Gain is a measure of the ability of a device.

E-field: Electric field is a vector field that represents the ~~force~~ ~~per~~ force per unit charge experted on a test charge at any point of space.

Why need 2 Ray Ground model:

Definition: is a radio wave propagation model that describes the received signal strength between a transmitter and receiver.

Propagation?

Ans: In context of wireless communication refers to the way electromagnetic waves travels through different medium.

Traffic intensity?

Ans: measured the average demand for a communication channel expressed in Erlang, represent the amount of traffic time that a channel is occupied by traffic over given period